

Interview Summary	Application No.	Applicant(s)	
	10/653,978	FUKUTANI ET AL.	
	Examiner	Art Unit	
	Ling X. Xu	1775	

All participants (applicant, applicant's representative, PTO personnel):

(1) Ling X. Xu. (3) _____.

(2) Mr. Jason M. Okun. (4) _____.

Date of Interview: 12 September 2005.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
If Yes, brief description: _____.

Claim(s) discussed: 23 and 24.

Identification of prior art discussed: None.

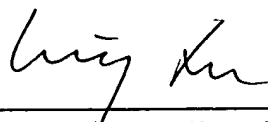
Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Counsel agreed to cancel claims 23-24 in order to place the application in condition for allowance. Counsel also proposed two new dependent claims and some changes in the IDS filed on 8/16/2005. The Examiner accepted the new claims and the changes made in the IDS form 1449 submitted on 8/16/2005.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.



Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

JP,07-075063,B [CLAIMS]

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*Corresponds to JP-A 63-220411
in IDS filed 8/16/05*

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CLAIMS

[Claim(s)]

[Claim 1] The vertical-magnetic-recording medium which is distributed in a substrate, the nonmagnetic phase covered on this substrate, and this nonmagnetic phase, and is characterized by the long thing containing the ferromagnetic phase of the configuration of the shape of needlelike or a column in the direction vertical to the front face of said substrate.

[Claim 2] The vertical-magnetic-recording medium given in the 1st term of a patent claim a nonmagnetic phase is amorphous and a ferromagnetic given phase is a crystalline substance.

[Claim 3] The vertical-magnetic-recording medium given in the 2nd term of a patent claim it is FeTi with an amorphous nonmagnetic phase, and a ferromagnetic given phase is FeTi of bcc.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[Industrial Application]**

Especially this invention relates to a vertical-magnetic-recording medium about magnetic-recording media, such as a magnetic tape and a magnetic disk.

[Description of the Prior Art]

In magnetic recording, as high density record exceeding the longitudinal recording method used conventionally, vertical magnetic recording is proposed and researches and developments are furthered energetically.

In order to realize this vertical magnetic recording, the medium which prepared the magnetic film which has a vertical easy axis to a magnetic film side as a magnetic-recording medium is required. CoCr, CoTi, CoV, CoMo, CoW, CoMn, CoRu, etc. using the crystal magnetic anisotropy of carrying out orientation of the c axis of Co (hcp structure) of a principal component at right angles to a film surface, and setting an easy shaft as it as a magnetic film with current and such magnetic properties are known (1984 the Magnetics Society of Japan, Vol.8, No.1, 17P).

[Problem(s) to be Solved by the Invention]

Co which is a rare resource is required for the above-mentioned conventional vertical-magnetic-recording medium. Generally as for the element in which ferromagnetism is shown in ordinary temperature in addition to Co, Fe and nickel are known. However, since Fe is bcc structure and nickel is fcc structure, the uniaxial anisotropy of c shaft orientations of hcp does not exist like Co. For this reason, the vertical-magnetic-recording medium which used Fe or nickel as the principal component was not necessarily produced easily conventionally.

[Means for Solving the Problem]

it distributes in a substrate, the nonmagnetic phase (what has magnetization lower than a paramagnetism phase or the after-mentioned ferromagnetism phase is included) covered on this substrate, and this nonmagnetic phase, and the vertical-magnetic-recording medium of this invention is long in a direction vertical to the front face of said substrate — it is constituted including the ferromagnetic phase of the configuration of the shape of needlelike or a column.

The vertical-magnetic-recording medium of this invention has an amorphous nonmagnetic phase, and it can also be constituted so that a ferromagnetic phase may be a crystalline substance.

The vertical-magnetic-recording medium of this invention can also be constituted so that it may be FeTi with an amorphous nonmagnetic phase and a ferromagnetic phase may be FeTi of bcc.

[Function]

A ferromagnetic phase is magnetically separated by the parent of a nonmagnetic phase, and this invention offers that the cross section of this enforcement phase is needlelike, or the vertical-magnetic-recording medium which has good magnetic properties by using the magnetic shape anisotropy of having a notes-like configuration.

[Example]

Next, this invention is explained with reference to a drawing.

Drawing 1 (1) and (2) are the top views and sectional views showing the front face of the vertical-magnetic-recording medium of one example of this invention, respectively. The FeTi alloy which formed membranes by the RF magnetron sputtering method realized the magnetic film which consists of the nonmagnetic phase 1 which is a parent, and the ferromagnetic phase 2 in a parent in this example, using glass as a substrate 3. The nonmagnetic phase 1 consists of amorphous FeTi, and the ferromagnetic phase 2 consists of FeTi of the crystalline substance of bcc.

The production conditions are as follows. A target is a multicomponent target which combined six pieces for Ti chip of 8mm angle the pure Fe target of 4 inch FAI, and on it. And membranes were formed about 0.8 micrometers of thickness on the glass substrate in the state of the high vacuum of 7×10^{-7} to 7×10^{-8} torrs or less of ultimate vacuums on spatter conditions with a charge power 300W and an argon pressure of 5×10^{-3} to 3×10^{-3} torrs. In addition, water cooling of the substrate 3 was carried out. Thus, when the membranous fine structure was observed with the transmission electron microscope about the produced magnetic film, it checked that it was the configuration of the front face shown in drawing 1 (1) and (2), and a cross section.

The sample oscillatory type magnetometer estimated the magnetic properties of this example.

Drawing 2 shows a magnetization curve by the result. From now on, the good magnetic properties of saturation magnetization $M_s 260 \text{ emu/cc}$, perpendicular anisotropy field $H_k 2.7 \text{ kOe}$, vertical coercive force $H_c^{**} 0.17 \text{ kOe}$, and coercive force H_c within field ** and 0.16 kOe were acquired. In addition, according to the X-ray microanalyser, the presentation of Ti was 17at(s)% at this time.

Furthermore, when the argon pressure in the RF magnetron sputtering method was made high, about the sectional view, as shown in drawing 1 (3), the ferromagnetic phase 2 became pillar-shaped, and magnetic properties also with this good were acquired. Furthermore, next, the organic film was used as a substrate 3, and the vertical-magnetic-recording medium was produced. And when record playback assessment was carried out, the property good as a vertical medium was acquired also in this case.

In addition, although the FeTi alloy was used as a magnetic film in the above-mentioned example, other alloys are sufficient as for example, Fe, other elements, nickel and other elements, Co, other elements, etc. moreover -- although the producing method also used the RF magnetron sputtering method in the above-mentioned example -- RF spatter, DC spatter, and MBE -- law, a CVD method, the vacuum deposition of any well-known thin film coating technology, etc. are conventionally usable.

[Effect of the Invention]

A ferromagnetic phase is distributed in the parent of a nonmagnetic phase by the magnetic film which consists of a non-MAG phase and a ferromagnetic phase, and this invention has that the cross section of a ferromagnetic phase is needlelike, or the effectiveness taken below by producing the vertical-magnetic-recording medium which has a column-like configuration.

(1) Also in Fe which shows ferromagnetism, and the magnetic film which used nickel as the principal component, it became producible [a vertical-magnetic-recording medium] in ordinary temperature other than Co which is hcp structure.

(2) Since it became producible [the vertical-magnetic-recording medium which uses as a principal component Fe which are abundant resources], the price of a vertical-magnetic-recording medium became cheap.

[Translation done.]

JP,07-075063,B [DESCRIPTION OF DRAWINGS]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

Drawing 1 (1) and (2) are drawings having shown the magnetic properties of the example which shows the top view of the vertical-magnetic-recording medium of one example of this invention and a sectional view, and drawing 1 (3) in the sectional view of other examples of this invention, and shows drawing 2 to drawing 1 (1) and (2), respectively.

1 A nonmagnetic phase, 2 .. A ferromagnetic phase, 3 .. Substrate.

[Translation done.]

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CORRECTION OR AMENDMENT

[Kind of official gazette] Amendment by convention of Article (before amendment by the Heisei 6 law No. 116.) 64 of Patent Law

[Category partition] The 4th partition of the 6th category

[Publication date] August 9, Heisei 11 (1999)

[Announcement number] Japanese Patent Publication No. 7-75063

[Announcement day] August 9, Heisei 7 (1995)

[Annual volume number] Patent official report 7-1877

[Application number] Japanese Patent Application No. 62-52340

[Patent number] 2138958

[International Patent Classification (6th Edition)]

G11B 5/66

H01F 10/14

[Procedure amendment]

1 The term of a "claim" "the vertical-magnetic-recording medium which consists of the same ingredient as 1 substrate, the nonmagnetic phase covered on this substrate, and this nonmagnetic phase, is distributed in this nonmagnetic phase, and is characterized by the long thing containing the ferromagnetic phase on needlelike or a column in the direction vertical to the front face of said substrate.

2 The vertical-magnetic-recording medium given in the 1st term of a patent claim a nonmagnetic phase is amorphous and a ferromagnetic given phase is a crystalline substance.

3 Vertical-magnetic-recording medium given [a given nonmagnetic phase is amorphous FeTi] in the 2nd term of a patent claim a ferromagnetic given phase is FeTi of bcc. It amends as ".

2 Amend the 3rd column "the inside of this nonmagnetic phase" of nine lines "the inside of this nonmagnetic phase from the same ingredient as this nonmagnetic phase."

[Translation done.]

JP,08-018883,B [CLAIMS]

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*Corresponds to JP-A 62-270473
in IDS filed 8/16/05*

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CLAIMS

[Claim(s)]

[Claim 1] The manufacturing method of the porosity filter characterized by carrying out surface treatment of the porous bodies, such as ceramics and a metal, by the thin film forming methods, such as physical vapor deposition and the chemistry depositing method, and carrying out cutback control of the pore aperture of the surface.

[Claim 2] The manufacturing method of the porosity filter given in the 1st term of a patent claim the given thin film forming methods are physical vapor deposition, such as a vacuum deposition method, the sputtering method, and ionization vacuum deposition.

[Claim 3] The manufacturing method of the porosity filter given in the 1st term of a patent claim the given thin film forming methods are the chemistry depositing methods, such as a CVD method and a plasma-CVD method.

[Translation done.]

JP,08-018883,B [DETAILED DESCRIPTION]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**(Field of the invention on industry)**

This invention relates to the manufacturing method of the porosity filter which made it possible to carry out cutback control of the aperture of a porous body freely.

(Prior art)

Conventionally, the porous body of a ceramic metallurgy group is used as catalyst support, a filter, etc., and the thing of various apertures is offered. And the manufacture is performed by fabricating and calcinating the raw material powder of a fixed particle size generally, and making with a sintered compact.

(Trouble which invention tends to solve)

However, in said conventional method, even if it uses an impalpable powder raw material, a crystal will cause grain growth during baking, each crystal grain will be set to about 0.5 micrometers or more, and the aperture of the sintering porous body obtained will be set to about 0.1 micrometers or more. For this reason, even if it uses very detailed raw material powder, it is most difficult to obtain the porous body of an aperture minuter than this with a sintering process.

(Means for solving a trouble)

this invention person succeeded in making the pore aperture on the front face of a porous body reduce, and manufacturing a filter in view of the above-mentioned conventional technique using the porous body conventional sintered compact type by performing physics and processing according the front face to the chemical thin film forming method as a result of research. Moreover, on that occasion, the knowledge of the ability to carry out the cutback control of the pore aperture freely was carried out by adjusting surface treatment conditions.

That is, this invention is the manufacturing method of the porosity filter characterized by carrying out surface treatment of the porous bodies, such as ceramics and a metal, by the thin film forming methods, such as physical vapor deposition and the chemistry depositing method, and carrying out cutback control of the pore aperture of the surface.

The porosity filter base material made into a processing object by this invention approach may be a sintering metal body, ceramics, etc. from which a powder raw material is generally sintered and physical-vapor-deposition **** or a chemical sediment layer is obtained the top face and around the surface by the film method that what is necessary is just that to which it adheres firmly, in addition may be desiccation silica gel, a zeolite, etc. [of a very fine particle]

As a thin film forming method, the chemistry depositing methods, such as a CVD method besides physical vapor deposition, such as a vacuum deposition method, the sputtering method, and ionization vacuum deposition, and a plasma-CVD method, are applied.

Although a thin film B is formed in the front face of the porous body surface particle A in a film formation process so that the cross section may be sketched in drawing 3 According to the sputtering

method and ionization vacuum deposition (the ion plating method), about 30%, according to the CVD method, formation of surroundings lump thin film layer B' on about 40% of side face can arise, and cutback change of the aperture of porous body surface pore can be carried out in the surface by this. In addition, since according to the vacuum deposition method there is no formation of surroundings lump thin film layer B' on a particle side face if it remains as it is, it is desirable to lean a processed porous body sample in this case, and to make it rotate.

The formation rate of a thin film can perform easily that a vacuum deposition method carries out cutback control of the pore aperture of a porous body surface at the magnitude of arbitration by adopting an approach suitably and processing need time amount since 100-1000A / min, and the ion plating method are [1000-10000A / min, and a CVD method] several 10 - 100A of numbers for 1000-10000A / min, and the sputtering method.

Furthermore, if it is when forming the thin film of different construction material from a processing-object porous body, since the film of the ceramics can be formed in the front face of a metal porous body and the filter of an abrasion resistance porous body can be manufactured, for example, even if it applies solid-state fine particles as a filtered processing object, profitableness, such as becoming the porosity filter which said front face is not damaged by those contact, and was excellent in endurance, is demonstrated.

(Example)

Example: 1 The aluminum₂O₃ porosity sintered compact of about 0.1 micrometers of apertures was used as the substrate, and surface treatment was carried out with the sputtering system as shown in drawing 1 R> drawing.

in addition, drawing 1 -- setting -- 1 -- a substrate (aluminum₂O₃ porosity sintered compact of a processed material), and 2 -- a substrate electrode holder and 3 -- an up electrode and 4 -- a target and 5 -- a vacuum housing (sputtering room) and 6 -- exhaust air and 7 -- a gas installation bulb and 8 -- an RF generator and 9 -- an adjustment machine -- it comes out.

First, the substrate (aluminum₂O₃) was washed at the following processes as sputtering pretreatment.

(1) Inside of an oxygen ambient atmosphere, 600 degrees C. 30-minute baking (2) desalted water -- ultrasonic-cleaning 5-minute (3) desiccation, 100 degrees C, and 30 minutes The substrate 1 washed according to the above-mentioned process next is carried on the substrate electrode holder 2 in the sputtering room 5 (lower electrode). After attaching 2Oaluminum₃ target 4 on the disk of the up electrode 3 of the location which faces this, it exhausted from the flue connector 6 and exhausted to the high vacuum to the order of 10-6Torr with the oil diffusion pump continuously to the order of 10-2Torr with the oil sealed rotary pump.

In the condition, argon gas was introduced until it became the pressure of 10-3Torr from the line 7 in the sputtering interior of a room, the high frequency (13.56MHz) from the RF power source 8 and the adjustment machine 9 was impressed to the lower electrode side, adjusting the pressure to 5x10-5Torr by the main valve, sputter etching was performed, and the surface layer was removed.

After defecating an aluminum₂O₃ porosity sintered compact by the above processing, high frequency was impressed to the up electrode side, and the front face of a substrate 1 was coated with aluminum₂O₃.

As a result of carrying out SEM observation of the substrate which carried out surface preparation, by changing said aluminum₂O₃ coating processing time showed that it was reduced at a rate of about 60A / min, and the cutback control of the surface pore aperture could be freely carried out in the range of the aperture before 0 - substrate processing (0.1 micrometers).

Example: 2 The sputtering system as used the aluminum₂O₃ porosity hollow filament of the outer diameter of about 1mm, the bore of about 0.5mm, and about 0.1 micrometers of tube wall apertures as a base material and shown in drawing 2 showed that the cutback control of the aperture of surface pore could be carried out freely like the case of an example 1, when aluminum₂O₃ was coated in the

JP,08-018883,B [DETAILED DESCRIPTION]

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same procedure as said example 1, rotating a base material and SEM observation of the front face was carried out.

in addition, drawing 2 -- setting -- 1 -- the aluminum2O3 porosity hollow filament base material of a processed material, and 2 -- a base material electrode holder and 3 -- an up electrode and 4 -- a target and 5 -- a vacuum housing (sputtering room) and 6 -- exhaust air and 7 -- a gas installation bulb and 8 -- an RF generator and 9 -- an adjustment machine -- it comes out.

(Effect of the invention)

According to the manufacture approach of the porosity filter which carries out surface treatment of the porous bodies, such as ceramics of this invention approach, and a metal, above by the thin film forming methods, such as physical vapor deposition and the chemistry depositing method, and carries out cutback control of the pore aperture of the surface (1) depending on the calcinating method for calcinating the conventional impalpable powder raw material and obtaining a porosity sintered compact that the porosity filter of about 0.1 micrometers or less of surface pore apertures the achievement was the most difficult is obtained easily, and (2) -- suitably by selection of the thin film forming method, and adjustment of surface treatment time amount That the cutback control of the pore aperture of a porosity filter surface can be carried out freely and further different arbitration from the porosity substrate of (3) processing objects and a base material, for example, abrasion resistance construction material, wearing, and forming a layer membrane on the very fine particle side of a porosity filter surface The effectiveness which was excellent in many, like the cutback control of the pore aperture can be carried out is demonstrated.

[Translation done.]

JP,08-018883,B [DESCRIPTION OF DRAWINGS]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

The outline structure sectional view of a sputtering system for drawing 1 and drawing 2 to enforce this invention approach and drawing 3 are amplification sketch sectional views of the porous filter surface obtained by this invention approach.

Inside of drawing

- 1: A substrate, a base material (processed material), 2 : a substrate, a base material electrode holder,
- 3: An up electrode, 4 : target,
- 5: A vacuum housing (sputtering room), 6 : exhaust air,
- 7: A gas installation bulb, 8:RF generator, 9 : adjustment machine
- A: A porous body surface particle, B:thin film, B' : surroundings lump thin film layer,

[Translation done.]